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how they manage to resist the encroachments of each other and to use each as they all together take possession practically of the whole earth.

REFERENCES: Bailey, *Garden Making;* Coulter, *Plant Relations; Origin of Cultivated Plants.*

THE INDIVIDUAL ELEMENT IN THE TEACHING OF ARITHMETIC.

GEORGE W. MYERS.

IN educational gatherings, where the teaching of arithmetic is discussed, we are often told how this, that, or the other teacher has found the children attack an arithmetical topic. We are often given the precise form of the child's questions. The certainty with which teachers assure us that they have found the true method of the child, together with the contradictory character of their discoveries, leads us to doubt seriously whether we shall ever arrive at an agreement as to what "the method of the child" really is. There are those who doubt whether there exists any single method in arithmetic which may be regarded as "the method of the child." It seems quite clear from the questions of arithmetic classes that we may speak of "methods of children;" but this is a very different thing from "*the* method of the child," as commonly understood.

We recognize in theory that a peculiar caste of mind—a particular bent—arises from the particular environment and antecedent training of each pupil; but this does not seem to lay vital hold of our class-room practice in the elementary mathematics. Indeed, the teacher's conception of his office as teacher may be pretty accurately gauged from the extent to which he allows the individual element to control his practice. If this element control but slightly, he will regard his function as that of a taskmaster, to dole out to his imaginary average pupil the daily stint and then to act as a recitation post on the morrow. The text-book, which, in the nature of the case, must present its subject-matter largely with reference to the average pupil, must do the teaching. The taskmaster may even go so far as to include in his category of duties the obligation to encourage the pupil, both by rewards and penalties, to cover from day to day as much subject-matter as possible. This is to some teachers a comfortable conception of the teacher's office, but it is a very inadequate conception. It results in the artisan teacher.

On the other hand, if the individual element is given wide and free scope, the horizon of the teacher's function recedes indefinitely. He becomes the guide, the leader, the organizer, the creator. He uses the text instead of allowing it to use him. He pours the subject-matter of his teaching through the crucibles of his own mind, gives to it what the chemist calls a combining temperature, recreates it, breathes into it the breath of life, and makes it a vitalizing force in the thought-life of the pupil. This teacher is alert to seize upon the educative aspects of the environment, both past and present, of each pupil, and is ever struggling to heighten his skill to use this environment effectually. He uses the text-book, in some sense, as a half-way station between the advancing column of growing boys and girls and the great base of supplies in which the boys and girls live, move, and have their being. The school could ill afford to substitute the text-book for such a teacher; for he is the architect of human character. He is the artist teacher.

But when it is admitted that there is no single method of the child, the teacher's necessity for studying the way each child deals with the subject-matter of arithmetic is in no way lessened. Such admission demands merely that the emphasis be shifted from *the* method to the child—*this* child. It demands that each child be studied, and that the method which constitutes the object of the teacher's search shall be the method of this individual child. So far from contracting the scope of child-study for the teacher of arithmetic, the denial of the universal adaptability of one method extends it for each teacher as many fold as there are pupils to come under the influence of his teaching. The teacher's problem is not to work out a theory of education which fits the facts of the life of a child of some professor, or teacher of psychology, even though these facts have gotten into printed form. If it were possible to arrive at the ideal educational scheme by generalizing from the facts concerning individual children, no one child, nor ten children, nor one hundred children, could furnish facts of sufficient range, variety, and scope for a reliable generalization. At present, and no doubt for many years yet, all courses of study, all educational schemes, must have in them flexibility enough to yield to the needs of *this* pupil. The only successful method of dealing with this pupil must be determined by the teacher who has him in charge.

These things are accepted as true, if not trite, for nearly all subjects of the elementary curriculum save mathematics. There is still a widespread disposition to doubt their application here. We still seem possessed of the opinion that there is one and only one way of presenting mathematics in the elementary school. We deem it our business to search out this *one* method. Too many even think they have found it. If one-third or one-half of the pupils, after being treated by this method, fail to yield gratifying mathematical results, so much the worse for this third or half. Unfortunately, we say, these were handicapped by nature in being left number-blind. Is it not just possible, inasmuch as most of these mathematical failures make successes in life, that we, the sticklers for special methods, deserve the sympathy we bestow upon these so-called unfortunates more than they do? It would certainly seem the wiser practice to accept the child as a fact and to question the adequacy of the method.

Occasionally we do grow skeptical as to whether this method, which has to its credit or debit so many failures, is not partially to blame for the "mortality list." We accordingly seize some other principle, unduly magnify it, seek to organize all the principles of arithmetic around it, and label the product "a new method." We are now quite sure, for a brief space, that we have the panacea. Results, however, are again disappointing; and then another method and another, and so on.

The escape from this thraldom of mathematical teaching to special methods lies in the direction of a recognition that even elementary mathematics is too broad to be spelled out by any single principle, and that it is the chief business of the teacher to ascertain the most advantageous method for each pupil.

Having found it for a given case, he must not base generalizations too freely upon it.

Give the pupil access to the largest possible region of really practical and interesting subject-matter, turn him loose and study his mental peculiarities as revealed through his spontaneous activities. Refrain at every point from asking the pupil questions, to answer which would require him to think his own thought processes. Let him *do the work* without much, if any, analysis of thought processes.

Most of what is said here is old in its relation to the unmathematical subjects. It is said here merely to emphasize its relevancy to mathematical teaching. The general refusal of mathematical teachers to recognize this is throwing mathematical teaching into the rear of educational advance.

Questions such as are discussed in this paper will constitute the main part of the work of the teachers' professional course during the spring quarter. The other course will be for beginners in the professional school, and will be largely, though not exclusively, academic in character.

The study of subject-matter will be from a higher point of view than can be taken by the elementary pupil, who is mainly concerned with learning a limited part of the subject each day. The teacher must perform the office of director, and this can be done only in the light of clearly conceived principles, based upon a broader and fuller view of the subject in its entirety.

ART.

JOHN DUNCAN.

THE art in the School of Education divides itself naturally into two classes: (1) Art illustrative of the other subjects of the curriculum — history and literature, geography and nature study; (2) applied art, the making of things — pottery, fabrics, and furniture.

ILLUSTRATIVE ART.

The substantial aid that drawing, painting, and modeling render in making these studies more concrete and tangible